JW

NORTHWEST ENVIRONMENTAL SERVICES

June 24, 2016

Mr. Doug Glackin Superintendent Woodbury Central Community School District 408 S. 4th Street Moville Iowa 51039

Mr. Pat Benjamin 7 Moville Blacktop P.O. Box 25 Climbing Hill, IA 51015

Subject: Report on the Water Quality of Test Well #1 in Climbing Hill

Woodbury Central Community School District Shop Building

Climbing Hill, Iowa

Reg. No. 8811618, LUST No. 7LTV89

Former Service Station Climbing Hill, Iowa

Reg. No. 9217516, LUST No. 8LTU14

Dear Mr. Glackin and Mr. Benjamin:

This correspondence reports water the quality the analytical data on the samples collected from Test Well #1. This correspondence also reports on our efforts to improve water quality by further developing the test well so that the water quality is more representative of the water that would likely be produced from a drinking water supply well located in this area. This work was performed as part of the replacement of the East Association Well with a new drinking water supply well with better water quality. Recommendations for locating the new drinking supply well are provided at the end of this report.

Potential Well Development Problems and Water Quality Issues

Although the well log for Test Well #1 was provided in our February 22, 2015 Report on the Modification of the Climbing Hill Water Supply System, for convenience the well log is also provided as Attachment A of this correspondence. Figure 1 illustrates the location of Test Well #1. The test well is screened between 72 and 82 feet in the first clean sand with a grain size capable of producing a sufficient quantity of water for a new drinking water supply well. This screened interval is just below the mixed alluviums and fine flowable sands that occur at the base of the loess. The sand that occurs

in this screened interval is at a depth of only about 35 feet below the water table. At this shallow depth, with no clearly apparent overlying confining layers, and a thick underlying layer of shale separating this zone from the bedrock aquifer, water produced from this well should be considered surficial groundwater associated with the water table and likely at risk only for nitrates.

Nitrate can occur in high concentrations in the shallow groundwater in and around the Climbing Hill area due to surface runoff and infiltration from agricultural sources. Because shallow groundwater is generally much younger than the potentially confined or partially confined deeper bedrock zones of the Dakota Formation, groundwater in the shallower zones have not had a very long travel or residence time to leach out or accumulate inorganic minerals. As a result of the conditions discussed above, the upper groundwater zones are at risk of being high in nitrates whereas the deeper zones will much more likely have significant hardness along with an undesirable mixture of sulfates and metallic cations to cause poor water quality

The inorganic profile of the initial samples collected from the test well on October 20, 2015 resembled more like a water sample collected from the Dakota Formation than from the shallow groundwater in this area. For example; the test well is essentially a shallow well completed above the bedrock in the overlying mixed alluvium. Although the inorganic parameters are actually higher in the test well than both association wells, the aesthetic quality of the water from the test well are excellent with no discoloration, odor, or unpleasant taste. Water from the East Association Well is slightly discolored, has a strong iron taste, and seems to smell a little bit like rotten eggs. The explanation for this apparent contradiction between the existing Association Wells and the test well is likely the result of drilling several feet into the underlying shale.

The borehole of the test well was extended into the underlying shale to document lithology and to determine if there was a substantial thickness of shale to act as an aquitard between the better quality shallow groundwater and the poorer quality groundwater that can occur in the Dakota formation. The inorganic analytes are likely elevated after being released from shale particles that are likely present in the sand pack around the screen. The sand pack was likely contaminated by mud and turbid water that was present in the borehole when the underlying shale was penetrated several feet. These conditions were discussed with the IDNR staff and the IDNR provided their requirements on further well development of Test Well #1 as indicated below:

- 1. Use a 2-inch surge block to surge and thoroughly develop the well. This may take some effort.
- 2. Get the best pump for the job and pump a minimum of 1,000 gallons from the well. More might or might not be better, but we recommend you pump as much as you can in a day rental of the pump.
- 3. If the water is clean and clear, collect samples for analysis for nitrate, sulfate, iron (Fe), Manganese (Mn), Arsenic (As), and Hardness. Only arsenic is new.

Additional Well Development

Waterra USA Inc. was contacted regarding the best way to achieve each of the pumping goals set forth by the IDNR. The company representative with Waterra suggested the use of a Hydrolift actuator for

use at the surface, standard flow HDPE tubing with a surge block, and a standard bottom-hole check valve pump. The Hydrolift-2 actuator was rented and the other materials were purchased from Waterra. A generator was used to supply power for the eight to twelve hours of pumping. The hours of pump operation to achieve a purge volume of 1,000 gallons was to be dependent on pump output. Based on information provided by Waterra, this pump equipment should be able to purge 2 to 3 gallons per minute. Pump output would be measured using container of known volume and a stopwatch. Measurements were taken at the beginning and during the course of purging.

The Waterra shipment of the rental equipment and materials were received on April 5, 2016. The packing slip indicated that surge block was on back order, a major problem because of the need to further develop of well while purging. An additional trip back to Sioux City was made to find a substitute surge block that was capable of at least some degree of purging albeit not intended to be as effective as an engineered and manufactured surge block. To avoid becoming wedged in the screen, the substitute surge block did not cover the entire radius of the well. The well was pumped at a maximum rate of 1 gallon/min and not the 2 to 3 gallon/minute rate estimated by Waterra. Even at this slower pumping rate, the pump was able to draw the water down in the well to the level of the pump. A drawdown this rapid was likely due to shale contamination of the sand-pack and poor subsequent well development.

When the water was drawn down to the pump level, the Waterra actuator was shut down for several minutes to allow for well recovery. As a result of this lower pumping rate and the well recovery periods, an estimated 360 gallons of water were removed during a twelve hour development and purging episode. It was not practical to attempt a purge volume of 1,000 gallons not only because the time requirement but because the equipment being used and the substitute surge block were not achieving well development. The water remained somewhat turbid throughout development and purging.

Water Quality Sampling and Analytical Results

The test well was initially purged using a hand bailer and sampled on October 20, 2015. Based on the elevated concentrations of iron and manganese discussed below, further sampling was performed. On March 22, 2016 a "no purge" sample was collected prior to performing well purging. On April 7, 2015 after approximately 360 gallons of water was purged from the test well another sample was taken for just nitrate analysis. In order to obtain a sample with low turbidity and representative of the formation, the test well was allowed to stabilize for five days after development efforts. On April 12, 2015 a final set of samples for inorganic analysis were collected.

The water quality samples were submitted to the ACS Laboratory in Sergeant Bluff. Water quality samples were initially analyzed for iron (Fe), manganese (Mn), nitrate, sulfate, and hardness. The IDNR added an arsenic (As) analytical requirement along with the new well development and purging requirements on March 23, 2016. The ASC Laboratory was used because of 48-hour hold time for nitrate and the availability of specially preserved sample containers for the other analytes. ACS performed the nitrate analysis and forwarded the remainder of the samples to the TestAmerica Laboratory in Cedar Falls. The water quality analytical reports are provided in chronologically order in Attachment B.

Nitrate as nitrogen (NO3-N) has an EPA drinking water limit of 10 mg/L. Arsenic has an EPA drinking water limit of 0.01 mg/L. Nitrate and Arsenic have an enforceable EPA drinking water limit referred to as a Maximum Contaminant Limit (MCL). The other inorganic analytes do not have MCLs but have been assigned secondary standards based aesthetic qualities like taste and odor. The Table below provides the concentrations of the inorganic analytes detected in the water sample collected from the test well and provides the drinking water limits or secondary standard.

| Analyte | Nitrate | Sulfate | Fe | Mn | Hardness | Arsenic (As) |
|---------------------|---------|-------------|----------|-------|-----------|--------------|
| Reference Standard | 10* | 250 - 2,000 | 0.3 -1.0 | 0.05 | 180 - 500 | 0.01* |
| 10/20/15 Analytical | 0.514 | 92.2 | 8.13 | 0.279 | 194 | 0.01 |
| 03/22/16 Analytical | 0.754 | 72.5 | 0.286 | 0.444 | 292 | <0.08 |
| 04/07/16 Analytical | 13.4 | | | | LJL | ~0.00 |
| 04/12/16 Analytical | 12.3 | 34.6 | 0.519 | 0.790 | 400 | 0.00268 |

All samples are reported in mg/L. *Reference standard is an enforceable MCL.

As discussed above, only nitrate and arsenic have MCLs, the other values listed for all other analytes are either secondary standards recommended by the EPA or reference values and/or ranges found in the literature for undesirable concentrations in drinking water. A sulfate range is being proposed by the IDNR with the actual value of the standard depending on hardness and the actual concentration of the analyte. Based on our understanding of the sulfate standard, 250 mg/L is the secondary standard recommended by the EPA and the proposed State standard will range from 500 mg/L to 2000 mg/L.

Based on the analytical results, the water is considered hard at this location. Iron (Fe) and manganese (Mn) concentrations appear elevated compared to the reference values in the Table while sulfate and hardness concentrations appear more moderate. The iron (Fe) and manganese (Mn) concentrations along with hardness increased after purging the 360 gallons of water from the well, possibly due to the agitation from Waterra pump releasing analytes into the water and its failure to fully develop the well and remove shale contaminating the sand pack.

The Arsenic (As) detection limit and the concentration fell below the MCL and sulfate concentrations continue to decrease. The nitrate concentrations are very unusual with the first two samples collected having low concentrations while the last two samples having much higher concentrations that exceed the MCL. Although we do not understand with certainty why the first two samples indicated very low nitrate concentrations, the drilling method employed to both collect soil samples and to install Test Well #1 in the flowable sands may have affected water quality as discussed below.

The drillers used potable water stored in their tanks to increase the hydraulic head of the borehole. This procedure helps to prevent sand from flowing into the auger when extracting their split spoon sampler from the fine flowable sands that were encountered above the screened interval of the test well. Because of the volume of water used to drill and sample through these overlying fine sands, well development and purging with a hand bailer may have drawn down but not entirely removed some of the added water in the screened interval of the well resulting in the dilution of the nitrate concentration.

Conclusions and Recommendations

Both Mike O'Malley owner of O'Malley Drilling and who was onsite when the shale was encountered and Nick Kohlhof the local well driller who installed the neighbor's nearby private well, were

contacted to discuss well development and the water quality analytical results. Both were equally surprised by our ability to completely draw the well down using the Waterra pump at the low pumping rate being observed. Both of them indicated that the shale likely contaminated the filter pack and that surge development by a drill rig with a substantial surge block and substantial effort appears necessary in this case.

Mr. Kohlhof shared the details of the well log and construction depth from the neighboring private residential well and the well depth and soil descriptions were nearly the same as Test Well #1. This neighboring well produces ample water and his conclusion is that Test Well #1 is still not sufficiently developed. Mr. Kohlhof did not send us the well log for the neighboring private residential well as promised but did give us the following description:

0'-5' top soil

5'-60' yellow clay (presumed to be loess or loess derived silts and silty clays)

60'-70' fine sand

70'-75' medium sand

75'-82' coarse sand

(Mr. Kohlhof indicated that shale was likely below 82 feet but that his log did not indicate it was actually encountered.)

Screen set between 76' and 81'

We initially recommended that we have Mr. Kohlhof develop Test Well #1 with his rig using a long surge block for a 2-inch well that we can likely fabricate or purchase. We also recommended that we use a commercially available well additive design to breakdown bentonite clays in drinking water well development. After development, we recommended that the Waterra system be used again to purge the desired 1,000 gallons prior to sampling. We also considered sampling the neighboring private residential well for nitrates,

It seems likely that in this case, poor well development would more likely affect the other water quality parameters like iron (Fe) and manganese (Mn) more than the nitrate concentration. Since the shallow groundwater at the West Association well also has an elevated a nitrate concentration, we now consider the shallow groundwater in this area to either exceed or at risk of exceeding the MCL for nitrate. As a result, these recommendations for further well development effort on Test Well #1 were not further pursued

We have no solution for the nitrate issue except drill through the shale and screen another test well in a deeper sand zone or consider a new well location closer to the West Association Well and screen in the same lower 'salt and pepper sands' as the West Association Well. In addition to potential well interference, the new drinking water supply well needs to stay in close proximity to the existing water main that had carried water from the former Barn well prior to being plugged this past fall.

A location in close proximity to this existing water main will limit damage and disturbance to the County property and be much less costly than installing even a modest segment of new water main. As shown in Figure 1, this water main runs along the northwest and southeast property boundary. A recommended location to consider is shown in Figure 1. We recommend that a test well location be

drilled to a depth that would allow 10 feet of well screen to be installed in the salt and pepper sands. Based on the well log for the west Association Well this depth will not likely exceed 110 feet.

Respectfully Submitted,

Daniel Ruppert

Certified Groundwater Professional

cc: Mr. Steve Reinders, Cunningham Lindsey

Mr. Mark Nahra, Woodbury County Engineer

Mr. Gary Brown, Woodbury County Emergency Management

Mr. Jeff White, IDNR

(No longer a viable well location) - Private Well Proposed new test is water well tocation . West Association well Deer Run Try Figure 1: Proposed New Test Well Location

ATTACHMENT A

SOIL BORING LOG & MONITORING WELL CONSTRUCTION DIAGRAM Boring/MW Test Well 1 Facility Climbing Hill Facility Deer Run Trail Name Address Climbing Hill, IA Boring Depth (Feet) x Diameter (Inches) 87' x63/4" **Drilling Method** Hollowstem Auger Well Contractor Registration# 10029 Logged by Dan Ruppert Date & Time 10-12-15 Date & Time 10-12-15 **Ground Surface** 100.0 Top of Casing 103.7 Start 8:30 End 18:00 Elevation (ASL) Elevation (ASL) Well Construction Details Depth Sample Sample PID/OVA Rock Formations, Soil, Color and in Feet Depth (PPM) No. Type Classifications, Observations such as Riser at ground +3.7' surface 0' LOESS (0-45') Silt to silty clay, light brown, 1 1 SS ND 3 2 SS ND wet below 32' (CL) 5 3 SS ND 7 4 SS ND 9 5 SS ND 11 6 SS ND 13 7 SS ND 8 15 SS ND 17 9 SS ND 19 10 SS ND 20 11 SS ND 21 12 SS ND 23 13 SS ND 25 14 SS ND 27 15 SS ND 29 16 SS ND 31 17 SS ND 33 18 SS ND 35.42 V 35 19 SS ND Bentonite Plug 37 20 SS ND 39 21 SS ND 41 22 SS ND 43 23 SS ND 45 24 SS ND 47 25 SS ND 49 26 SS ND MIXED ALLUVIUM (48-54') Silt with a trace of fine 51 27 SS ND sand, interbeded with lenses of silty clay and fine 53 28 SS sand below 50', water bearing, light brown (ML). ND 55 29 SS ND MIXED ALLUVIUM (54-61') Fine silty sand with 57 30 SS ND lenses of fine sandy clay and fine, water bearing, 59 31 SS ND light brown (SM). 60 32 SS ND 61 33 SS ND COARSE ALLUVIUM (61'-72') Sand, fine grained, 63 34 SS ND water bearing, light brown, a few sandy clay 65 35 SS ND lenses below 66' (SP). 67 36 SS ND 69 37 SS ND 71.0 71 38 SS ND 72.0 73 39 SS ND COARSE ALLUVIUM (72'-82) Sand, medium 75 40 SS ND grained with some gravel, water bearing, light 77 41 SS ND greyish brown (SP). Filter Pack 79 42 SS ND 81 43 SS ND 82.0 83 44 SS ND UPPER DAKOTA (81'-82') Weathered shale, dark 85 45 SS ND grey. 87 87.0 46 SS ND Bottom of Boring (87') SS indicates Split Spoon Sample

| from riser (TOC) Level: 39.12' | | · · · · · · · · · · · · · · · · · · · | | | | |
|---|---------------------|---------------------------------------|----------|------|------|---|
| | Water level | Date: | 10/20/15 | | | 1 |
| from ground surface evel: 35.42' | from riser (TOC) | Level: | 39.12' | | | |
| 10.75 Section Carlotte 20701. 00.42 | from ground surface | Level: | 35.42' | | | |

ATTACHMENT B



205 Sergeant Square Drive

Sergeant Bluff, IA 51054

Phone: 712-943-4888

Fax: 712-943-4889

Cell: 712-253-1254

Email: sfranco@acslab.net

To: Mr. Grant Nelson

NorthWest Environmental Services, Inc.

PO Box 401

Alton, IA 51003

Phone: 1-800-586-2170 Cell: 712-395-2899

nwest@midlands.net

WELL WATER REPORT - NORTHWEST ENVIRONMENTAL SERVICES, INC. Climbing Hill

lowa Certified Laboratory # 279 SMOL 4500-CI- B. (mg Cl7/L) Chloride (mg CaCO3/L) SMOL 2340 C. Hardness Total 0.17 3/24/16 12:30 PM SMOL 4500 NO3 -E -SMOL 4500 NO2-B Nitrogen 03/24/16 (NO3-N) Nitrate (mg/L) 0.754 0.015 BF Analysis Start Date/Time: Method Detection Limit----> Analysis Completion Date/Time: **Analyst**: Test Well #1 Sample Method Used ---<u>.</u> March 28, 2016 Sample Type 3/22/16 3:12 PM Collection Date/Time Sample Report Date:

Submitted by: S.K. Franco, Chemist

Description of units and abbreviations possibly used within this report:

grab - grab sample, mg/L- Milligrams per Liter, Set. - Settled, ml/L - Milliiters per Liter, < - less than, comp - 24 hour composite sample, HACH - HACH Water Analysis Handbook, COD - Chemical Oxygen Demand, -N - expressed as Nitrogen, gal-gallons, > - greater than, TVSS - Total Volatile Suspended Solids, SVI - Sludge Volume Index, NU - no units, MGD-million gallons per day, n.d. - none detected. TSS - Total Suspended Solids, BOD - Biochemical Oxygen Demand, NH₃-N - Ammonia Nitrogen, LLE - Liquid, Liquid Extraction



<u>Test</u>America

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Cedar Falls 704 Enterprise Drive Cedar Falls, IA 50613 Tel: (319)277-2401

TestAmerica Job ID: 310-76863-1

Client Project/Site: Nonstate Drinking water samples

For:

Analytical Consulting Service 205 Sergeant Square Drive Sergeant Bluff, Iowa 51054

Attn: Sharlyn Franco

Bu C. Thurs

Authorized for release by: 4/1/2016 9:05:22 AM

Brian Graettinger, Manager of Project Management brian.graettinger@testamericainc.com

Designee for

Linda Cmelik, Project Manager II (319)277-2401

linda.cmelik@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Case Narrative

Client: Analytical Consulting Service

Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-76863-1

Job ID: 310-76863-1

Laboratory: TestAmerica Cedar Falls

Narrative

Job Narrative 310-76863-1

Comments

No additional comments.

Receipt

The sample was received on 3/24/2016 8:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.6° C.

Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: Analytical Consulting Service Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-76863-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---------------|-------------------|----------------|----------------|----------------|
| 310-76863-1 | NWES Test Well #1 | | _ | received |
| | TO TEST WEIL #1 | Drinking Water | 03/22/16 15:12 | 03/24/16 08:45 |

Client Sample Results

Client: Analytical Consulting Service

Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-76863-1

Client Sample ID: NWES Test Well #1

Date Collected: 03/22/16 15:12 Date Received: 03/24/16 08:45 Lab Sample ID: 310-76863-1 Matrix: Drinking Water

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Analyzed | Dil Fac | Analyst |
|------------------------------------|----------------|----------------|--------|-----|------|------------|----------------|---------|---------|
| Sulfate | 72.5 | | 5.00 | | mg/L | | 03/28/16 11:59 | | AJG |
| Method: 200.7 Rev 4.4 - Metals (IC | P) - Total Red | overable | | | | | | | |
| Analyte | | Qualifier | RL | MDL | Unit | D | Analyzed | Dil Fac | Analyst |
| Arsenic | <0.0800 | | 0.0800 | | mg/L | | 03/25/16 16:40 | | OAD |
| Iron | 0.286 | | 0.100 | | mg/L | | 03/25/16 16:40 | | OAD |
| Manganese | 0.444 | | 0.0100 | | mg/L | | 03/25/16 16:40 | | OAD |
| Method: SM 2340B - Total Hardne | ss (as CaCO3 |) by calculati | ion | | | | | | |
| Analyte | | Qualifier | RL | RL | Unit | D | Analyzed | Dil Fac | Analyst |
| Hardness as calcium carbonate | 292 | | 6.62 | | mg/L | | 03/24/16 15:46 | | LBB |
| General Chemistry | | | | | | | | | |
| Analyte | Result | Qualifier | RL | MDL | Unit | D | Analyzed | Dil Fac | Analyst |
| Turbidity | 1.90 | 11 | 1.00 | - | NTU | — <u> </u> | 03/24/16 15:36 | | JNR |

Certification and Definitions Summary

Client: Analytical Consulting Service

Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-76863-1

Laboratory: TestAmerica Cedar Falls

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

| hority | Program | | EPA Region | Certification ID | Expiration Date |
|------------------------|---------------------------------|---------------------------------|-------------------|---|-----------------|
| a | State Prog | gram | 7 | 007 | 12-01-15 * |
| The following analytes | are included in this report, bu | it are not certified under this | certification: | | |
| Analysis Method | Prep Method | Matrix | Analyt | e | |
| | | | , | TO A STATE OF THE | |
| 200.7 Rev 4.4 | 200.2 | Drinking Water | Arseni | C | |

Qualifiers

General Chemistry

| Qualifier | Qualifier Description |
|-----------|--|
| Н | Sample was prepped or analyzed beyond the specified holding time |

Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|----------------|---|
| и | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ИL | Minimum Level (Dioxin) |
| VC . | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC . | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| EF | Toxicity Equivalent Factor (Dioxin) |
| EQ | Toxicity Equivalent Quotient (Dioxin) |

^{*} Certification renewal pending - certification considered valid.

Method Summary

Client: Analytical Consulting Service Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-76863-1

| Method | Method Description | Protocol | Laboratory |
|---------------|--|----------|------------------|
| 300.0 | Anions, Ion Chromatography | MCAWW | TAL CF |
| 200.7 Rev 4.4 | Metals (ICP) | EPA | |
| SM 2340B | Total Hardness (as CaCO3) by calculation | SM | TAL CF TAL CF |
| 180.1 | | | TAL CF |
| 180.1 | Turbidity, Nephelometric | MCAWW | |

Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401





Cooler/Sample Receipt and Temperature Log Form

| Client Information | | |
|--|--------------------------|--|
| Client: Analytical & Con | Sulfing Service | 8 Inc |
| City/State: Sorgeant Blubb | , CA | Project: |
| Receipt Information | | |
| Date/Time Received: 03/24/ | 16 0845 | Received By: Subhid |
| Delivery Type: 💢 UPS | FedEx | FedEx Ground US Mail Spee-Dee |
| TA Courier | TA Field Services | Client Drop-off Other: |
| Condition of Cooler/Containers | | |
| Sample(s) received in Cooler? | X Yes No | If yes: Cooler ID: |
| Multiple Coolers? | Yes 🕅 No | If yes: Cooler # of |
| Cooler Custody Seals Present? | Yes No | If yes: Cooler custody seals intact? X Yes No |
| Sample Custody Seals Present? | Yes X No | If yes: Sample custody seals intact? Yes X No |
| Trip Blank Present? | Yes No | If yes: Which VOA samples are in cooler? |
| | | |
| | | |
| Temperature Record | | |
| | lue ice Dry ic | |
| Temperature Blank? X Yes | □ No ID & | Bottle Type: |
| Note: If yes, use temp blank for mea | | specify sample ID(s) and bottle type used to take measurement. |
| Thermometer ID: 61 | | |
| Uncorrected Temp (°C): 1.4'L | | Corrected Temp (°C): 1.6°C |
| Exceptions Noted | 1990年1990年1986年1986年11 | |
| If temperature exceeds criteria If yes: Is there evidence to | a, was sample(s) rec | eived same day of sampling? Yes No |
| te.g., building septa, proken/cr | acked bottles?) | t the integrity of sample containers is compromised? Yes No |
| Note: If yes, contact PM before proc | eeding. If no, proceed w | ith login |
| Additional Comments | | |
| | | |
| | - | |
| | | |
| | | |

Document: CF-LG-WI-002

Revision: 21 Date: 7/28/2015

Test.\merica

Cedar Falls, IA 50613 Cedar Falls Division 704 Enterprise Drive

Phone: 319 - 277 - 2401 or 1 - 800 - 750 - 2401 Fax: 319 - 277 - 2425

sfranco@acslab.net Invoice To: Same as reporting address 712-943-4888 Proj. Man. E-mail Address: Proj. Man. Telephone: Project Name: Project Number: -Project Manager. TA Quote #: Your PO #: (712) 943-4889 Fax: Company: Analytical & Consulting Services, Inc. Address: 205 Sergeant Square Drive City/State/Zip Code: Sergeant Bluff, IA 51054 Send Report To: Sharlyn Franco Telephone Number: (712) 943-4888 Sampled by: (Print Name) (Signature)

| Preservative Matrix | # of containers shipped Grab Composite Field Filtered H/O' (Red & White Label) H/SO+ Plastic (Yellow & White Label) H/SO+ Class(Yellow & White Label) H/SO+ Class(Yellow & White Label) H/SO+ Plastic (Yellow & White Label) | 3 X X X X X X X X X X X X X X X X X X X | | | | | | eceipt at TestAmerica. Hours in ADVANCE to receive results NOTES: NOTES: NOTES: Hours in ADVANCE to receive results | ssed. | |
|---------------------|---|---|---|--|--|--|---------------------------------------|--|--|--|
| | | 22-Mar 15:12 3 | | | | | | n the time of receipt at TestAr AT LEAST 48 Hours in ADV | niunents; additional charge. estAmerica disposing of samp | |
| | | NWES Test Well #1 22. | 9 | | | | , , , , , , , , , , , , , , , , , , , | NOTICE: All furn around times are calculated from the time of receipt at TestAmerica. NOTICE: Pre-Arrangements must be made AT LEAST 48 Hours in ADVANCE. | NOTE: There may be a charge assessed for TestAmerica disposing of sample remainders. Paliconische Land. | |

Shipped Via:

Laboratory Comments:

emperature Upon Receipt:

1) 4/1/2016

Test/America

704 Enterprise Drive Cedar Falls Division

Cedar Falls, IA 50613

or 1 - 800 - 750 - 2401 Phone: 319 - 277 - 2401 Fax: 319 - 277 - 2425

E-mail Results ax Results TAT brabnat2 seria liso teuM) TAT HSUF je sfranco@acslab. Invoice To: Same as reporting address 712-943-4888 Please send all email reports as pdf files. Thanks. Analyze For Proj. Man. E-mail Address; Relinquished by Proj. Man. Telephone: Total Hardness Shipped Via: Project Name: --Project Number --Project Manager: Sulfate TA Quote #: Your PO #: Manganese **Total Iron** ime Laboratory Comments: Olher Specify. Matrix appula Drinking Water vastewater/ Groundwater (712) 943-4889 500 mL Clear Bottle yous (Black & White Label) 1250, Glass(Yellow & White Labe H2SO4 Plastic (Yellow & White Lab NOTICE: Pre-Arrangements must be made AT LEAST 48 Hours in ADVANCE to receive results Comments: Temberature Upon Receipt: Fax: (Orange & White Label) with RUSH turn around time commitments; additional charges may be assessed.

NOTE: There may be a charge assessed for TestAmerica disposing of sample remainders.

Relinquished by:

Date

Time Received by: HCI (Blue & White Label) HO3 (Red & White Label) Э⊃į Field Fillered Company: Analytical & Consulting Services, Inc. NOTE: All turn around times are calculated from the time of receipt at TestAmerica Composite 10. Juna Address: 205 Sergeant Square Drive # of containers shipped City/State/Zip Code: Sergeant Bluff, IA 51054 15:12 Time Sampled Send Report To: Sharlyn Franco Telephone Number: (712) 943-4888 03/23/16 3.24 11 22-Mar Date Sampled Sampled by: (Print Name) (Signature) In Con dNWES Test Well #1 estAri gSample ID 4/1/2016



ANALYTICAL & CONSULTING SERVICES, INC.

www.acslab.net

205 Sergeant Square Drive

Sergeant Bluff, IA 51054

Phone: 712-943-4888

Fax: 712-943-4889

Cell: 712-253-1254

Email: sfranco@acslab.net

To: Mr. Grant Nelson

NorthWest Environmental Services, Inc.

PO Box 401

Alton, IA 51003

Phone: 1-800-586-2170

Cell: 712-395-2899

nwest@midlands.net

WELL WATER REPORT - NORTHWEST ENVIRONMENTAL SERVICES, INC. Climbing Hill

Iowa Certified Laboratory # 279 SMOL 4500-CI- B. (mg Cl⁷/L) Chloride (mg CaCO3/L) SMOL 2340 C. Hardness Total 0.17 (mg/L) SMOL 4500 NO3 -E -SMOL 4500 NO2-B 4/7/16 8:00 PM Nitrogen (NO3-N) 04/07/16 0.015 13.4 BF Analysis Completion Date/Time: Analysis Start Date/Time: Method Detection Limit--Test Well #1* Sample Method Used ---<u>.</u> April 11, 2016 Sample Type 4/7/16 3:30 PM Date/Time Collection Sample Report Date:

0.30

Submitted by: S.K. Franco, Chemist

Description of units and abbreviations possibly used within this report:

TVSS - Total Volatile Suspended Solids, SVI - Sludge Volume Index, NU - no units, MGD-million gallons per day, n.d. - none detected. grab - grab sample, mg/L- Milligrams per Liter, Set. - Settled, ml/L - Milliiters per Liter, < - less than, comp - 24 hour composite sample, HACH - HACH Water Analysis Handbook, COD - Chemical Oxygen Demand, -N - expressed as Nitrogen, gal-gallons, > - greater than, TSS - Total Suspended Solids, BOD - Biochemical Oxygen Demand, NH₃-N - Ammonia Nitrogen, LLE - Liquid, Liquid Extraction

^{*}Sample received in lab above 5.7° C and on ice.



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WELL WATER REPORT - NORTHWEST ENVIRONMENTAL SERVICES, INC. Climbing Hill

lowa Certified Laboratory # 279

Chloride (mg Cl7/L) SMOL 4500-CI- B.

> (mg CaCO3/L) SMOL 2340 C.

Hardness

Total

0.30

0.17

SMOL 4500 NO3 -E -SMOL 4500 NO2-B 4/14/16 10:50 AM Nitrogen (No₃-N) (mg/L) 0.015 12.3 Method Detection Limit----> Analysis Start Date/Time: Test Well #1* Sample I.D. Method Used --April 15, 2016 Sample Type 4/12/16 1:48 PM Date/Time Collection Sample Report Date:

Submitted by: S.K. FYANCO, Chewist

04/14/16

Analyst:

Analysis Completion Date/Time:

Description of units and abbreviations possibly used within this report:

grab - grab sample, mg/L- Milligrams per Liter, Set. - Settled, ml/L - Milliliters per Liter, < - less than, comp - 24 hour composite sample, HACH - HACH Water Analysis Handbook, COD - Chemical Oxygen Demand, -N - expressed as Nitrogen, gal-gallons, > - greater than, TVSS - Total Volatile Suspended Solids, SVI - Sludge Volume Index, NU - no units, MGD-million gallons per day, n.d. - none detected. TSS - Total Suspended Solids, BOD - Biochemical Oxygen Demand, NH₃-N - Ammonia Nitrogen, LLE - Liquid, Liquid Extraction

^{*}Sample received in lab above 5.7° C and on ice.



<u>TestAmerica</u>

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Cedar Falls 704 Enterprise Drive Cedar Falls, IA 50613 Tel: (319)277-2401

TestAmerica Job ID: 310-78401-1

Client Project/Site: Nonstate Drinking water samples

For:

Analytical Consulting Service 205 Sergeant Square Drive Sergeant Bluff, Iowa 51054

Attn: Sharlyn Franco

Linda Comelia

Authorized for release by: 4/22/2016 4:52:33 PM

Linda Cmelik, Project Manager II (319)277-2401 linda.cmelik@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Case Narrative

Client: Analytical Consulting Service

Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-78401-1

Job ID: 310-78401-1

Laboratory: TestAmerica Cedar Falls

Narrative

Job Narrative 310-78401-1

Comments

No additional comments.

Receipt

The sample was received on 4/14/2016 8:50 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.5° C.

Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: Analytical Consulting Service Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-78401-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---------------|-------------------|----------------|----------------|----------|
| 310-78401-1 | NWES Test Well #1 | Drinking Water | 04/12/16 13:48 | |

Client Sample Results

Client: Analytical Consulting Service

Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-78401-1

Client Sample ID: NWES Test Well #1

Date Collected: 04/12/16 13:48

Date Received: 04/14/16 08:50

Lab Sample ID: 310-78401-1

Matrix: Drinking Water

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Analyzed | Dil Fac | Analyst |
|---------------------------------------|---------------|-----------|-------------|-----|------|----------------|----------------------------|---------|----------------|
| Sulfate | 34.6 | | 5.00 | | mg/L | | 04/19/16 01:39 | 5 | AJG |
| Method: 200.7 Rev 4.4 - Meta | Is (ICP) | | | | | | | | |
| Analyte | Targette 1990 | Qualifier | RL | MDL | Unit | D | Analyzed | Dil Fac | Analyst |
| Iron | 0.519 | | 0.100 | | mg/L | | 04/18/16 16:11 | 1 | OAD |
| Manganese | 0.790 | | 0.0100 | | mg/L | | 04/18/16 16:11 | 1 | OAD |
| Analyte Arsenic | 0.00268 | Qualifier | 0.00200 — | MDL | mg/L | — ^D | Analyzed 04/22/16 14:51 | | Analyst OAD |
| Method: SM 2340B - Total Ha | | | calculation | | | | | | |
| Analyse | Result | Qualifier | RL | RL | Unit | D | Analyzed | Dil Fac | Analyst |
| | | | 6.62 | | mg/L | | 04/20/16 08:43 | 1 | LBB |
| Analyte Hardness as calcium carbonate | 400 | | 0.02 | | | | | | |
| | 400 | | 3.32 | | | | | | |
| Hardness as calcium carbonate | | Qualifier | RL | MDL | Unit | D | Analyzed | Dil Fac | Analyst |

Certification and Definitions Summary

Client: Analytical Consulting Service

Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-78401-1

Laboratory: TestAmerica Cedar Falls

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

| Authority owa | Program State Program | | EPA Region | Certification ID | Expiration Date 12-01-15 * |
|----------------------------------|-------------------------------|-----------------------|------------|---|----------------------------|
| | s are included in this report | | | | |
| Analysis Method 200,7 Rev 4.4 | Prep Method | Matrix Drinking Water | Analyt | AND THE RESERVE OF THE PERSON | |
| | | Drinking Water | Manga | | |

General Chemistry

| Qualifier | Qualifier Description |
|-----------|--|
| Н | Sample was prepped or analyzed beyond the specified holding time |

Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|----------------|---|
| n | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CNF | Contains no Free Liquid |
| DER | Duplicate error ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision level concentration |
| MDA | Minimum detectable activity |
| EDL | Estimated Detection Limit |
| MDC | Minimum detectable concentration |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| NC | Not Calculated |
| ND | Not detected at the reporting limit (or MDL or EDL if shown) |
| PQL | Practical Quantitation Limit |
| QC | Quality Control |
| RER | Relative error ratio |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |

^{*} Certification renewal pending - certification considered valid.

Method Summary

Client: Analytical Consulting Service Project/Site: Nonstate Drinking water samples

TestAmerica Job ID: 310-78401-1

| Method | Method Description | Protocol | Laboratory |
|---------------|--|----------|------------|
| 300.0 | Anions, Ion Chromatography | MCAWW | TAL CF |
| 200.7 Rev 4.4 | 7.7 Rev 4.4 Metals (ICP) | EPA | TAL CF |
| 200.8 | Metals (ICP/MS) | EPA | TAL CF |
| SM 2340B | Total Hardness (as CaCO3) by calculation | SM | TAL CF |
| 180.1 | Turbidity, Nephelometric | MCAWW | TAL CF |

Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions. SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

TestAmerica Cedar Falls





Cooler/Sample Receipt and Temperature Log Form

| Client Information | |
|--|--|
| Client: A 4 C S | |
| City/State: | Project: |
| Receipt Information | State of the state |
| Date/Time Received:4-14-16 08:50 | Received By C |
| Delivery Type: UPS FedEx | FedEx Ground US Mail Spee-Dee |
| TA Courier TA Field Services | Client Drop-off Other: |
| Condition of Cooler/Containers | |
| Sample(s) received in Cooler? | If yes: Cooler ID: |
| Multiple Coolers? Yes XNo | If yes: Cooler# of |
| Cooler Custody Seals Present? Yes X No | If yes: Cooler custody seals intact? Yes |
| Sample Custody Seals Present? Yes No | If yes: Sample custody seals intact? Yes |
| Trip Blank Present? Yes No | If yes: Which VOA samples are in cooler? ↓ |
| | |
| | |
| Temperature Record | Bound Brown and Committee of the Property of the Committee of the Committe |
| Coolant: Wet ice Blue ice Dry ice | Other: NONE |
| | |
| | Bottle Type: |
| Note: If yes, use temp blank for measurement. If no, something the second secon | pecify sample ID(s) and bottle type used to take measurement. |
| The state of the s | Correction Factor (°C): +O.1 |
| Uncorrected Temp (°C): (), \(\frac{1}{2}\), | Corrected Temp (°C): 6.50 |
| Exceptions Noted | |
| 1) If temperature exceeds criteria, was sample(s) rece | eived same day of sampling? Yes No |
| a) If yes: Is there evidence that the chilling proce | ss began? Yes No |
| 2) If temperature is <0°C, are there obvious signs that | |
| (e.g., bulging septa, broken/cracked bottles?) | Yes No |
| Note: If yes, contact PM before proceeding. If no, proceed wi | th login |
| Additional Comments | |
| | |
| | |
| | |
| | |

Document: CF-LG-WI-002

Revision: 21 Date: 7/28/2015

Test/\merica

704 Enterprise Drive Cedar Falls Division

Company: Analytical & Consulting Services, Inc.

Cedar Falls, IA 50613

Phone: 319 - 277 - 2401 Fax: 319 - 277 - 2425

or 1-800-750-2401

Your PO #:

sfranco@acslab.net Invoice To: Same as reporting address 712-943-4888 Proj. Man. E-mail Address: Proj. Man. Telephone: Project Number --Project Manager: Project Name: TA Quote #: (712) 943-4889 Fax: Address: 205 Sergeant Square Drive City/State/Zip Code: Sergeant Bluff, 1A 51054 Send Report To: Shartyn Franco Telephone Number: (712) 943-4888

Sampled by: (Print Name)

(Signature)

E-mail Results × siluseA xe TAT brebnet2 RUSH TAT (Must call ahea Analyze For Total Arsenic Total Hardness Sulfate Manganese Total Iron Olher Specify: Matrix appnis Drinking Water 16j6waletV stoundwater 500 mL Clear Bottle Yone (Black & White Label) 1204 Glass (Yellow & White Laber Preservat H2SO4 Plastic (Yellow & White Lab (leds.) HOSN 1Cl (Blue & White Label) HNO3 (Red & White Label) benetili? blei? NOTE: All turn around times are calculated from the time of receipt at TestAmerica Composite Grab # of containers shipped 13:48 Time Sampled 12-Apr Date Sampled NWES Test Well #1 Sample ID

Comments: Temperature Upon Receipt NOTE: There may be a charge assessed for TestAmerica disposing of sample remainders
Relinquished by: H:30sn Q1-13-10

dry

NOTICE: Pre-Arrangements must be made AT LEAST 48 Hours in ADVANCE to receive results

with RUSH turn around time commitments; additional charges may be assessed.

Date

Please send all email reports as pdf files. Thanks.

Time Relinquished by

Date

Shipped Via:

Laboratory Comments:

4616 9855 <u>م</u> コプロ 538 H \prec racking #

1/22/2016

4/14/2016

Login Container Summary Report

310-78401

| Temperature readings: | | | | | | |
|-----------------------|---------------|----------------------------------|-----------------|-----------------------------|--------------|--|
| Client Sample ID | <u>Lab ID</u> | Container Type | Container pH | Preservative Added (mls) | <u>Lot #</u> | |
| NWES Test Well #1 | 310-78401-A-1 | Plastic 250ml - with Nitric Acid | <2 | Miles and the second second | | |

Page Lof L